



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,448	08/27/2003	Makoto Kashiwaya	Q75424	4596
23373	7590	06/08/2006	EXAMINER	
SUGHRUE MION, PLLC 2100 PENNSYLVANIA AVENUE, N.W. SUITE 800 WASHINGTON, DC 20037			LEE, SHUN K	
			ART UNIT	PAPER NUMBER
			2884	

DATE MAILED: 06/08/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/648,448

Applicant(s)

KASHIWAYA ET AL.

Examiner

Shun Lee

Art Unit

2884

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 March 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-11 and 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings were received on 23 March 2006. These drawings are acceptable.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 2, 6, and 8-11 are rejected under 35 U.S.C. 102(b) as anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Iwabuchi *et al.* (US 2002/0041977).

In regard to claims **1**, **10**, and **11**, Iwabuchi *et al.* disclose a stimutable phosphor sheet comprising:

- (a) a stimutable phosphor layer (paragraphs 30 and 31) containing a europium-activated cesium bromide based stimutable phosphor as a main ingredient, said stimutable phosphor layer being formed by a vacuum film forming technique (paragraphs 6 and 37-42); and
- (b) a substrate (paragraph 38) supporting said stimutable phosphor layer, wherein a maximum intensity of emission generated in the wavelength range of 490-510 nm is equal to or lower than 50% of a maximum intensity of the emission generated in the wavelength range of 440-460 nm (see Fig. 1).

The sheet of Iwabuchi *et al.* lacks an explicit description that emission occurs when the stimutable phosphor layer is exposed to electron beams. However, the stimutable phosphor layer have properties such as emission. Therefore, emission occurring when the stimutable phosphor layer is exposed to electron beams is an inherent characteristic of the sheet of Iwabuchi *et al.* Alternatively, it would have been obvious to one having ordinary skill in the art at the time of the invention that the sheet of Iwabuchi *et al.* would emit radiation when exposed to electron beams.

In regard to claim **2** which is dependent on claim 1, Iwabuchi *et al.* also disclose (paragraph 38) a reflective film formed between said substrate and said stimutable

phosphor layer, said reflective film for improving efficiency of emergence of stimulated light emission.

In regard to claim **6** which is dependent on claim 1, Iwabuchi *et al.* also disclose (paragraphs 46 and 47) a barrier film formed on said stimuable phosphor layer, said barrier film for preventing chemical deterioration (e.g., oxidation) of said stimuable phosphor layer, and a film thickness of said barrier film ranges from 0.01 μm to 5 μm .

In regard to claim **8** which is dependent on claim 1, Iwabuchi *et al.* also disclose (paragraphs 30 and 31) that said stimuable phosphor layer is a layer containing as said main ingredient a cesium bromide based stimuable phosphor using europium as an activator, and a molarity ratio between said activator and said cesium bromide based stimuable ranges from 0.0005:1 to 0.01:1.

In regard to claim **9** which is dependent on claim 1, Iwabuchi *et al.* also disclose (paragraph 43) that a film thickness of said stimuable phosphor layer ranges from 50 μm to 1000 μm .

6. Claims 3-5 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iwabuchi *et al.* (US 2002/0041977) as applied to claims 2 and 6 above, and further in view of Neriishi *et al.* (US 6,784,448).

In regard to claim **3** (which is dependent on claim 2), claims **4** and **5** (which are dependent on claim 2), and claim **7** (which is dependent on claim 6), the sheet of Iwabuchi *et al.* lacks that said reflective film is a thin film made of one of Al, Al alloys, Ag and Ag alloys, and a film thickness of said reflective film ranges from 0.01 μm to 5 μm , a barrier film formed between said reflective film and said stimuable phosphor layer made

of one of silicon oxides, titanium oxides, silicon nitrides, cerium oxides and magnesium fluorides, said barrier film for preventing oxidation of said reflective film, and a film thickness of said barrier film ranges from 0.01 μm to 5 μm , or that said barrier film is a thin film made of one of silicon oxides, titanium oxides, silicon nitrides, silicon oxynitrides cerium oxides and magnesium fluorides. Neriishi *et al.* teach (column 6, lines 66-67; column 13, lines 4-12) that a reflective film is formed from materials such as titanium oxide or by vacuum deposited aluminum, in order to obtain the desired optical properties. Neriishi *et al.* also teach (column 6, lines 66-67; column 13, lines 4-12) that a protective film is formed from materials such as organic and/or by inorganic compounds with optional additives such as titanium oxide having thickness of 0.1 to 1000 μm , in order to obtain the desired protective and optical properties. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to provide one or more organic and/or by inorganic layers in the sheet of Iwabuchi *et al.*, in order to obtain desired protective and optical properties for the sheet.

7. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iwabuchi *et al.* (US 2002/0041977) in view of Arakawa *et al.* (US 4,896,043).

In regard to claim **15**, Iwabuchi *et al.* disclose a method of producing stimuable phosphor sheet which comprises: a stimuable phosphor layer (paragraphs 30 and 31) containing a europium-activated cesium bromide based stimuable phosphor as a main ingredient, said stimuable phosphor layer being formed by a vacuum film forming technique (paragraphs 6 and 37-42); and a substrate (paragraph 38) supporting said stimuable phosphor layer, wherein a maximum intensity of emission that is generated in

a wavelength range of 490-510 nm is lower than a maximum intensity of the emission generated in a wavelength range of 440-460 nm, said method comprising:

- (s1) a step of preparing said substrate in a film forming system;
 - (s2) a step of evaporating both of europium and cesium bromide by using a resistance heating in said film forming system;
 - (s3) a step of performing evaporation under an evaporation atmosphere of 1.33×10^{-2} Pa (which is in a range of 0.01-3 Pa) to form said stimuable phosphor layer in said film forming system;
 - (s4) a step of heating said substrate during said evaporation; and
 - (s5) a step of annealing said stimuable phosphor layer after it was formed on said substrate,
- wherein a heating temperature for annealing said stimuable phosphor layer is in a range of 150-250°C.

The method of Iwabuchi *et al.* lacks an explicit description that emission occurs when the stimuable phosphor layer is exposed to electron beams and that a heating temperature for heating said substrate is in a range of 120-250°C. However, the stimuable phosphor layer have properties such as emission. Therefore, emission occurring when the stimuable phosphor layer is exposed to electron beams is an inherent characteristic of the sheet of Iwabuchi *et al.* Alternatively, it would have been obvious to one having ordinary skill in the art at the time of the invention that the sheet of Iwabuchi *et al.* would emit radiation when exposed to electron beams. Further, Arakawa *et al.* teach (column 10, lines 57-64) that a substrate is heated to

approximately 25-400°C during vacuum deposition of a phosphor. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to select a known substrate temperature (e.g., 25-400°C) as the unspecified substrate temperature in the method of Iwabuchi *et al.*

Response to Arguments

8. Applicant's arguments filed 23 March 2006 have been fully considered but they are not persuasive.

Applicant argues (third paragraph on pg. 9 to first paragraph on pg. 10 of remarks filed 23 March 2006) that the recited characteristic of the stimuable phosphor layer when exposed to an electron beam in the present claims is different from the emission characteristics of the stimuable phosphor layer when exposed to exciting light. Examiner respectfully disagrees. First, it is noted that applicant does not provide any explanation or evidence that the emission spectrum would be different when exposed to an electron beam as compared with light. On the contrary, the prior art suggests that the emission spectrum is almost the same when exposed to an electron beam, x-ray, or light. For example, Nakamura states (US 4,891,277 column 6, lines 45-50) that "Also has been confirmed that the spontaneous emission spectrum of the phosphor of the invention given upon excitation with X-rays or cathode rays are almost the same as those given upon excitation with ultraviolet rays which are shown in FIG. 3. As is clear from the comparison between FIG. 2 (Curves 1 and 2) and FIG. 3 (Curves 1 and 2), the stimulated emission spectrum of the divalent europium activated complex halide phosphor according to the invention is almost the same as the spontaneous emission

Art Unit: 2884

spectrum thereof". Thus the prior art expressly teaches that an europium-activated cesium bromide based stimutable phosphor (e.g., a $\text{BaBr}_2\text{-CsBr:0.001Eu}^{2+}$ phosphor) have an emission spectrum that is almost the same for both spontaneous and stimulated emission when exposed to an electron beam, x-ray, or light. Therefore, emission occurring when the stimutable phosphor layer is exposed to electron beams is an inherent characteristic of the sheet of Iwabuchi *et al.* Alternatively, it would have been obvious to one having ordinary skill in the art at the time of the invention that the sheet of Iwabuchi *et al.* would emit radiation when exposed to electron beams.

Applicant argues (last paragraph on pg. 10 of remarks filed 23 March 2006) that Iwabuchi *et al.* does not involve heating the substrate or annealing. Examiner respectfully disagrees. Iwabuchi *et al.* state (paragraph 39) that " ... The support (or a protective layer formed on the support) may be cooled or heated, while the phosphor is deposited on it. After the vacuum deposition is complete, the formed (deposited) phosphor layer may be subjected to a heating (anile) treatment. The treatment is cried out, for example, at a temperature of 50 to 600° C. for a few hours under nitrogen gas (which may contain a small amount of oxygen or hydrogen gas) atmosphere". Thus Iwabuchi *et al.* expressly teach heating the substrate while the phosphor is deposited on it and annealing at a temperature of 50 to 600°C after the vacuum deposition is complete.

Applicant argues (second and third paragraphs on pg. 11 of remarks filed 23 March 2006) that the steps of heating the substrate and annealing the stimutable phosphor layer after it was formed on the substrate as recited in claim 15 are not

Art Unit: 2884

performed. Examiner respectfully disagrees. As discussed above, Iwabuchi *et al.* expressly teach heating the substrate while the phosphor is deposited on it and annealing at a temperature of 50 to 600°C after the vacuum deposition is complete.

Applicant argues (first two paragraphs on pg. 12 of remarks filed 23 March 2006) that the wide range of the temperature of 50 to 600°C is far from disclosing the specific temperature of 150 to 250°C for annealing after evaporation as recited in the present claims. Examiner respectfully disagrees. Iwabuchi *et al.* expressly teach annealing temperatures of 50 to 600°C. Thus Iwabuchi *et al.* expressly teach annealing temperatures of 150 to 250°C.

Applicant argues (last three paragraphs on pg. 12 of remarks filed 23 March 2006) that the combination of Iwabuchi *et al.* and Neriishi *et al.* does not render the claimed invention obvious since Neriishi *et al.* does not remedy the deficiencies of Iwabuchi *et al.* Examiner respectfully disagrees for the reasons discussed above.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 4,891,277 (Nakamura).

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shun Lee whose telephone number is (571) 272-2439.

The examiner can normally be reached on Tuesday-Friday.

Art Unit: 2884

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SL


CONSTANTINE HANNAHER
PRIMARY EXAMINER